

**PLANAR NANOWIRE BASED SENSOR ELEMENTS, DEVICES, SYSTEMS AND
METHODS FOR USING AND MAKING SAME**

ABSTRACT OF THE DISCLOSURE

Sensor elements, and devices that incorporate those elements are provided, where the sensor comprises a thin semiconductor nanowire that is disposed upon, and integral to, an insulating substrate, where the nanowire is electrically coupled to a sensing surface that binds or otherwise interacts with an analyte of interest to yield a measurable effect on the nanowire element. The methods utilize extremely thin semiconductor on insulator substrates to provide nanowire dimensions for sensing elements that are fabricated using conventional semiconductor fabrication processes.